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Tineina of the Central United States.—By V. T. CHAMBERS.

Æsyle, gen. nov.

Though the species described below is very near *Lithocolletis*, I have felt compelled to erect for it this new genus. The neuration of the fore wings is exactly that of *Lithocolletis*, except that the marginal veins other than the first costal and first dorsal are very indistinct. That of the hind wings is nearer to that of *Gracilaria*, the subcostal proceeding almost straight to the apex, but being very faint. The discal (?) vein is furcate on the posterior margin, and the median (?) is short and simple; but the costal margin is not at all excised, rather in this respect resembling *Elachista* than either *Lithocolletis* or *Gracilaria*. The head of the single specimen before me is smooth, and from its appearance I think it never had a tuft, though as the vertex is a little denuded, it possibly may have had a small one; the form of the head and the antennæ are those of *Lithocolletis*, the antennæ not reaching the apex of the wings; the maxillary palpi, though small, are distinct, resembling those of some of the small species of *Gracilaria*, while the labial palpi are a little larger than in *Lithocolletis*, and smaller than in *Gracilaria*, with the second joint somewhat clavate, and the third more than half as long as the second, and pointed, thus resembling in form the palpi of a true *Gelcehia* more than those of *Lithocolletis*. In the dead insect the maxillary palpi are porrected and the labial recurved, drooping a little. The tongue is small and sparingly scaled, and the cilia a about as in *Lithocolletis*.

A. fasciella (n. sp.)

Head and palpi silvery white, except a small brown spot on the outer surface of the second joint of the labial palpi at the tip; antennæ fuscous, paler toward the base. Legs white, with brown spots on the anterior surface of the first and second pair. The thorax is silvery white. The fore wings, as far as the basal one fourth, are pale or yellowish brown, margined with brown behind, then follows a wide, silvery white fascia; then a wide pale brown one margined with darker brown behind, extending to the middle of the wing, and followed by a second narrower white fascia; then follows another brownish band, also dark margined behind and followed by a third white one, which is narrower than the preceding ones; then follows another dark margined brown one; behind which is a fourth (narrow) white fascia, just before the tip, which is brown. There are thus four white fascia, separated by brown ones, and the base and tip of the wing are brown. The under surface is also brown; the brown fascia of the upper surface are tinged in some lights with pale golden. The second white fascia is a *little* oblique; the others are nearly straight. The fringes are silvery, a little flecked with brown at their base, where they adjoin the brown fascia. Abdomen brown above, silvery white beneath, and the apical tuft is silvery, tinged with golden.—*Al. ex.*, five sixteenths inch, Kentucky.

In a paper now in the hands of the Editors of the *Canadian Entomologist* for publication, I have described a species under the name of *Theisoa multifasciella*, which closely resembles this insect in ornamentation. The palpi of that species are about twice as long as in this species, and the colors are less showy and bright.

LITHOCOLLETIS—*L. symphoricarpeella* (n. sp.)

Brownish golden palpi of the general hue, but paler internally; face yellowish white; tuft, thorax and primaries brownish golden, deepening toward the apical part of the wings; there is a rather indistinct, whitish, median basal streak and two silvery white fascia, both internally dark margined, the first about the middle of the primaries, the other at the beginning of the cilia. Apex dusted with brown. There is a short, rather indistinct, oblique, white, costal streak close to the apex, and no hinder marginal line in the cilia. Under surface of the body brown, in some lights steel blue, with prismatic reflections. *Al. ex.*, $\frac{1}{4}$ inch, Kentucky. Larva cylindrical, mine tentiform, in the under side

of leaves of the Indian currant or red waxberry (*Symphoricarpus vulgaris*). I have not found it in the allied snowberry.

L. Mariæella (n. sp.)

Face and palpi white, terminal joint of the palpi brownish externally; tuft orange yellow; thorax and primaries golden; antennæ white, annulate with brown; primaries with two white fascia, one about the basal fourth, the other about the middle, both distinctly dark margined internally; before the cilia, a costal and opposite dorsal white streak, nearly meeting on the median line, and dark margined internally; just before the apex, an oblique, very distinct white streak, sometimes extending almost across the wing. No hinder marginal line; cilia a little paler than the wing. *Al. ex.*, one fourth inch.

Three specimens received from Miss Mary E. Murtfeldt, of Kirkwood, St. Louis county, Mo., who informs me that they were bred from larvæ of the cylindrical group, making a tent mine on the under surface of leaves of the Indian currant or red waxberry (*Symphoricarpus vulgaris*). She has also sent me a specimen of the mined leaf. The mine is larger than that of the preceding species, *L. symphoricarpeælla*, and so is the imago, and the two insects are not at all likely to be mistaken for each other. This species is much more likely to be mistaken, by the tyro, for *L. ornatella*, but is very readily distinguished in the larval state by the following characters: the larva of *L. ornatella* mines locust leaves, belongs to the flat group, and the mine is flat on the under and upper surface indifferently, and it leaves the mine to pupate; while this species has a cylindrical larva, which mines only the under surface, the mine being tentiform, and it pupates in a strong, white, roundish or oblong cocoon within the mine. The imago is less brilliant than that of *ornatella*, the tuft is larger, and orange or reddish orange, while that of *ornatella* is maroon brown, and the face of *ornatella* is brilliant metallic (like silver or polished steel, according to the light), while the face of this insect is white; the thorax and base of the wings of *ornatella* are rich maroon instead of golden, and there is a distinct, maroon brown hinder marginal line, which is wanting in this species. There are also other less striking differences. Miss Murtfeldt, in whose honor I have named this species, sends me the following notes of the mine and larva:

“Larva found Oct. 25, making a tentiform mine on under side of leaves of *Symphoricarpus vulgaris*. Length one fourth inch; diameter less than one sixteenth, cylindrical or subcylindrical, tapering slightly both

ways from the middle segments. Head very small, flattened, polished, honey yellow; jaws edged with rose color. General color of the body translucent golden yellow, immaculate. Incisions quite deep, two or three fine hairs on each side of each segment. The mine is made quite spacious by the wrinkling together of the under cuticle of the leaf. The frass is collected in one end of the mine. The insect pupates inside its mine, inclosed in a strong, white, roundish or oblong cocoon, similar in appearance to, though not so dense as, the cocoon of *Chrysopa*. The chrysalis is elongate, pointed, with the sheaths of the wings and legs extending almost to the tip of the abdomen, and of a honey yellow color."

*L. lysimachiae*lla (n. sp.)

The larva is cylindrical and very small. It makes a very small tentiform mine on the under side of the leaves of (*Lysimachia lanceolata*) the loosestrife. The imago is, no doubt, very small—probably not larger than *L. desmodiella*, Clem., which is the smallest known species of this genus; but I have not succeeded in rearing it.

L. ambrosiæella.—*Can. Ent.*, vol. iii., p. 127.

It is necessary to make some corrections of the specific description of this species, as follows, viz.: The basal streak is sometimes confined to the wing, and does not pass back out on to the tegular and thorax; neither are the face and under surface deep steel blue, as stated; this error must have been caused by some peculiar direction or character of the light by which it was viewed; they are rather of a shining metallic white, and there is a saffron yellow spot on each side of each abdominal segment; the legs are of the same metallic hue with the abdomen, but the tarsi are annulate with black; the anterior tibiae are fuscous on their anterior surfaces, and the posterior are saffron yellow.

I have bred the species mentioned *loc. cit.* as mining leaves of *Helianthus gigantea* since the former note was written, and find it to be this species, as I supposed. It is very different from the species described *post* as *L. helianthivorella*, especially as to the character of the mine.

L. helianthivorella (n. sp.)

I do not deem it necessary to give a full description of this species, but will simply point out the particulars in which it differs from *L. ambrosiæella* (*sup.*): First—the mine of *ambrosiæella* is very small,

and is not visible on the upper surface until the upper cuticle begins to die, when the larva is fully grown. The mine of *L. helianthivorella* is more than twice as large as that of *ambrosiælla*, and is most distinct on the upper surface, when it produces a tubercular swelling.

Second—the larva of *ambrosiælla* has the head obscurely streaked and clouded with fuscous. I have never found these markings on the head of the larva of *helianthivorella*.

Third—the imago of *helianthivorella* has a small white spot on the dorsal margin of the primaries, which is wanting in *ambrosiælla*. The costal and dorsal streaks, which in *ambrosiælla* are simply white, have a brilliant metallic gloss in *helianthivorella*, and the latter species is the largest, having an *alar ex.* one twentieth of an inch greater than *ambrosiælla*. This appears to be a small difference, but when all other parts of the body are developed in the same proportion, it makes a very considerable; and when the insects are placed side by side, it makes a very striking difference in the size and appearance of the insects. I have compared numerous specimens of the two species, and notwithstanding their close resemblance, I have no doubt that they should be considered distinct species.

L. argentinotella, Clem.

In a single instance I have found this species mining the upper surface of elm leaves. Neither the mine, nor larva, nor insect, differed from those of the under surface of the same leaf. Prof. Frey, of Zurich, has strangely confounded it with *L. ulmella*, Cham.

L. alba-notella (n. sp.)

Head, palpi and antennæ glistening snow white; extreme apex of the antennæ dark brown; thorax white; primaries brilliant golden, rather pale, with a short, median, white basal streak, faintly dark margined toward the costa; basal fourth of the costa white (the base of the wings is also white, I think, but is a little rubbed, so that I can not be certain); four rather large, snow white costal streaks, the first of which is just before the middle of the costa, and the fourth is near the apex; three snow white, rather large dorsal streaks, the first of which is a little before the first costal streak, and the second and third of which are respectively opposite the second and third costal streaks, with which they sometimes meet, so as to form fasciæ. First costal and first dorsal somewhat oblique. First three costal and the three

dorsal streaks all faintly dark margined before, the dark margin of the first costal being the most distinct; wings not dusted, but with an exceedingly minute and indistinct apical spot. *Al. ex.*, one fourth inch.

The larva is cylindrical, and makes a small tentiform mine on the under surface of the black jack (*Quercus nigra*). This species approaches most nearly to *L. argentinetella*, Clem. It is one of the willow oak miners mentioned in the *Canadian Entomologist*, vol. v., p. 166.

L. quercibella (n. sp.)

Glistening snowy white; extreme tips of the antennæ brown. A pale golden basal streak begins on the costa, at the base, and passes back parallel with the fold to the golden apical portion of the wing, and is interiorly very faintly dark margined; apical third of the fore wing pale golden, with a black apical spot, and dark brown hinder marginal line at the *base of the dorsal and apical ciliae*. In the pale golden portion of the wing are *three* silvery costal and one silvery dorsal streak, all dark margined before. The first costal streak is larger than the others and its dark margin is somewhat oblique; the dark margins of the other streaks are straight; the dorsal streak is opposite to the first costal. Extreme costal ciliae tipped with fuscous. *Al. ex.*, one fourth inch.

The larva is cylindrical, and mines the under surface of the leaves of black jack (*Quercus nigra*), and the mine is usually near to the edge. It is one of the mines mentioned as mining willow oaks. *Can. Ent.*, vol. iii., p. 166.

This species is between *L. Clemensella* and *L. lucidicostella*, having the basal streak as in the latter, but having a less portion of the wing golden, and a larger portion white, as in *Clemensella*.

L. fuscocostella (n. sp.)

Glistening snowy white; antennæ pale yellowish; primaries snowy white, with the apical half pale golden, with a pale golden basal streak extending from the base of the costa along the costal margin to the golden apical half of the wing, and internally very faintly dark margined; in the golden apical part of the wing are *four* short and (except the first) straight costal streaks, all faintly dark margined before, the dark margin of the first being more distinct than those of the others, and also being oblique and produced along the extreme costa to the base. The streaks are nearly equi-distant. There are two short and

nearly straight white dorsal streaks, respectively, opposite the second and third costal streaks, both dark margined before; the dark margin of the second being at its apex, confluent with the dark brown hinder marginal line, which extends along the base of the dorsal and apical ciliae. Extreme costal ciliae tipped with dark brown, ciliae white, apical spot black. Secondaries pale yellowish white, ciliae white. Both pairs fuliginous beneath. *Al. ex.*, one fourth inch, Kentucky.

The larva is cylindrical, and makes a small tentiform mine on the under surface of leaves of white oaks (*Q. alba* and *Q. bicolor*). The mine is at the edge of the leaf, and the leaf is folded down over it.

This species resembles the preceding one very closely, and I would place it between that species and *L. lucidicostella*.

L. unifasciella (n. sp.)

Face, palpi, and under surface of the antennæ, silvery white. Upper surface of the antennæ dark brown, tuft silvery white, mixed above with pale golden, which becomes deeper at the sides; thorax and anterior wings rich reddish orange; there is a silvery white, slightly oblique fascia just behind the middle of the wing, nearest the base, on the dorsal margin, and curving slightly toward the base, near the costal margin, with small dark brown spot on the costa, margining it before, and distinctly dark margined behind, the dark margin being produced, both as a streak along the costa and a parallel one along the middle of the wing, the streaks spreading and uniting about the beginning of the costal ciliae, thus inclosing an oblong patch, which is not dusted; the fascia is but little angulated, and does not have the appearance of two confluent streaks; apical margin, along the base of the dorsal ciliae, very densely dusted with brown—the dusting in some specimens being connected with the dusted streaks above mentioned. A dark brown wider margined line at the base of the dorsal and apical ciliae. Ciliae yellowish. *Al. ex.*, one fourth inch, Kentucky.

The larva belongs to the second or flat group, and mines the upper surface of leaves of the black oak (*Q. tinctoria*). The maculae and transparent spots are distinct. Head whitish. First and second maculae dark brown, the others pale yellowish or pale brown. Frass scattered, mine oval at first flat, but afterward corrugated along the middle. It belongs to the same group as *L. bethunella*, which also mines the upper surface of leaves of *Q. tinctoria*; and it resembles *bethunella* closely as to the fascia, dusting and general color, but it lacks the costal and dorsal streaks of that species, and the fascia of *bethunella* is formed by

the confluence of the costal and dorsal streaks, and is angulated. I have met with a specimen (*bred*) which I believe to belong to this species, but in which the dusting was almost entirely absent, possibly it may be a distinct species.

L. æriferella, Clem.

I have bred this species from the leaves of the black jack (*Quercus nigra*), and have found it so often in groves of white oak (*Q. alba*) and black oak (*Q. tinctoria*), where there were no black jacks near, that I think it must mine the leaves of those species also.

L. Castaneocella (n. sp.)

Face and palpi silvery white; tuft, thorax and anterior wings reddish golden (or pale reddish orange?); antennæ dark brown, with a faint, narrow, whitish annulation at the base of each joint, toward the apex; each alternate joint is white, as is also the case in *L. bethunella* and *L. unifasciella*. There is a small white spot on the costal margin of the anterior wings, about the basal fourth, and therein it differs from *unifasciella* and a silvery fascia just beyond the middle (as in *unifasciella*, but not dark margined on the costa before, as in that species). The wing behind the fascia is dusted along the middle, the dusting extending over the entire apex. A small, white costal streak at the beginning of the costal ciliae, and another small one just before the apex, both in the dusted portion as in *bethunella*. A dark brown hinder marginal line, formed by the dusting, at the base of the ciliae. *Al. ex.*, one fourth inch, Kentucky.

The larva is flat, and mines the upper surface of leaves of the chestnut, (*Castanea Americana*), and of a species of oak. (The leaf was too much injured to determine the species of oak). When it was gathered from oak, the mine was supposed to be that of *L. hamadryadella*, and the larva was not closely observed, and it was placed in a large breeding cage with several other well known species, for the purpose of getting duplicates. Subsequently, on looking over them, I was surprised to find that this was an unknown ribbon like mine: not corrugated along the center, and with the pupa lying naked on a few threads of silk. It was then separated from the other mines, and produced this species. The imago is between *bethunella* and *unifasciella*, having some, but not all of the streaks of *bethunella*, which are wanting in *unifasciella*. The fascia resembles that of *unifasciella* more than that of *bethunella*. The

characters of the oak leaf mine were caused, I think, by confinement in the breeding cage; those from the chestnut resembled those of *L. betumella*.

LYONETIA—*L. apicistrigella* (n. sp.)

Snowy white; antennæ faintly tinged with fuscous; before the middle of the dorsal margin of the primaries is a blackish, or, in some lights, golden brown streak, pointing obliquely backward; just behind the middle is a larger one, and behind this again is a patch or streak of the same hue extending along the dorsal margin to the beginning of the cilia. Behind the disc, and continuous with the second dorsal streak, is a narrow, linear, median streak, of the same hue, which extends through the middle of the apical part of the wing, to a small golden brown patch, where it is deflected to the dorsal margin, passing around the golden brown patch, and along the dorsal margin, at the base of the cilia, to and around behind the circular, shining, apical spot, which is behind the golden brown patch; in its course it touches the blackish margined patch before the cilia; and the portion of it which extends along the base of the cilia contains two minute white dorsal streaks, the last of which is very small and very close to the apical spot. On the costal margin, about or a little behind the middle, is a rather indistinct blackish streak, which is continued just within and parallel to the margin for a short distance toward the base; behind it is another larger and more distinct streak, and behind this is another still larger and more distinct, all of the same hue, and pointing obliquely backward and behind them at the base of the cilia are three other small and indistinct ones of the same hue, pointing obliquely forward, the last being very close to the apical spot. *Al. ex.*, one third inch. Captured at the light in Kentucky, in August.

Another specimen, taken about the same time, I was inclined to regard as distinct, but, remembering the fate of two or three supposed European species, which prove to be only varieties of *L. clerckella*, I am inclined to regard this as not specifically different from the species above described. I have not seen *L. speculella*, Clem., but evidently this can not be it, as Dr. Clemens does not mention the fuscous line which passes through the apical part of the wing, and the costal markings appear to differ. However, considering the range of variation in *clerckella*, in Europe, it is possible that both *speculella* and the species above described may be mere varieties of it.

Oreotrypa O. (?) *quadri strigella* (n. sp.)

Silvery white; under surface of body, legs and antennæ sordid yellowish. There is a pale fuscous spot on the dorsal margin of the primaries, before the middle, and the extreme apical part of the primaries is very pale golden yellow, with a black spot at the apex. There are in the yellowish apical part two black costal streaks, and one dorsal one, and one transverse streak in the elia behind the spot, the first costal streak is very oblique, placed before the apical spot, pointing toward but not quite reaching it; the second is perpendicular to the spot, the dorsal streak is oblique and opposite to the first costal one, and both of these are margined narrowly behind with silvery white. *Al. ex.*, three eighths inch.

A single specimen came to the light at Camp Bee Spring, of the Kentucky geological survey, in Edmondson county, in the early part of July. The eye caps in this species present a singular structure, the scales being arranged in a series of alternate concentric rows; the tip of the primaries are turned up, or rather bent outward.

Prionoxystus *P. populiella* (n. sp.)

Glistening snow white; apical third of the primaries suffused with golden yellow. There are five, short, blackish costal streaks, the first very oblique at the beginning of the elia, the others in the elia; the fifth is opposite the apical spot, and a little behind it. From the apical spot two black streaks diverge through the apical elia. Three dorsal blackish streaks, the first being very oblique, and placed opposite the second and third costal streaks; the second is very oblique, opposite the third and fourth costal streaks, and points toward and almost attains the apical spot, the third dorsal is opposite to and almost continuous with the fifth costal streak. The third and fourth costal streaks are a little nearer together than the others. Under side of all the wings suffused with fuscous. *Al. ex.*, one fourth inch, Kentucky.

The larva mines the upper surface of the leaves of poplars (*P. dilatata* and *P. monilifera*). The mine is very winding, white, with a central, indistinct line of frass. It resembles that of *P. liriodendronella*. *P. suffusella* mines the leaves of poplars in Europe, but it seems to be quite different from this species.

P. liquidambarisella (n. sp.)

I am unable to distinguish this species from *P. villosella*, Cham., by any characters of the imago, or, indeed, in any way except by the mine.

The mines of both species are long and tortuous, but that of *vitifolia* is distinct, and with a well marked central line of frass, while that of *lepidanthus-sua*, like that of *P. vitigenella*, is indistinct, without any central line of frass, and resembling the indistinct track of a small snail. It mines the upper surface of the leaves of the sweet gum, *Liquidambar styraciflua*, in Southern Kentucky, throughout the summer.

P. ampelopsella. Clem. Ent., vol. III.

I have repeatedly bred this species from the mines imperfectly described *loc. cit.* p. 207. This mine is quite distinct from any other *Pogonocherus* mine, in that whilst it is a narrow line, like that of the other species, and whilst it is white, like those of *P. herichthysella* and *P. pyralisella*, yet the narrower line of which it is composed winds about over the same limited space, to such an extent that the mine looks like a large white blotch on the under surface of the leaves of *Ampelopsis quinquefolia*. Yet, strange to say, I have almost as often bred from the same sort of mines, in the same sort of leaves, gathered at the same time, and from the same vine, a form which lacks the characteristics of *ampelopsella*, and is undistinguishable from *P. vitifolia*, which makes an entirely different mine in grape leaves. *P. vitigenella*, Clem., from another quite different mine in grape leaves, is in the imago intermediate between *P. vitifolia* and the form of *ampelopsella*, described *loc. cit.* That is, there is a mine in grape leaves quite distinct from any other, and which produces only *P. vitifolia*, there is another distinct mine in grape leaves, which produces only *P. vitigenella*, there is a mine in the leaves of *Liquidambar* identical with that of *P. vitigenella* in grape leaves, but which produces an imago indistinguishable from *P. vitifolia*—and again, there is a mine in the leaves of *ampelopsis* very distinct from all of those above mentioned, yet which produces two forms of the imago, one of which resembles *P. vitigenella*, but is, nevertheless, distinct from it, and the other of which is indistinguishable from *P. vitifolia*, from grape leaves. Were not the differences in the mines so great, one would be strongly inclined to believe that all of their species were varying forms of one species. But, on that hypothesis, it would be difficult to account for the differences between the imagos and mines of *vitifolia* and *vitigenella* from grape leaves. *Vitifolia* and *vitigenella* mine the upper and *ampelopsella* only the lower surface of the leaves.

P. similicisella (n. sp.)

I know this species only in the larval state, and it appears to be

very rare. I have only twice met with it; on both occasions in Southern Kentucky, in July, and in each case the larva was just dead in the mine, and the parasitic larva which had killed it was lying beside it. It mines the upper surface of *Smilax glabra* leaves. I have never found it in Northern Kentucky, though *Smilax* is abundant. The mine is of a snowy white, with a central line of frass, long and winding, and resembles that of *P. liriodendronella*, Clem., in the leaves of the tulip tree (*Liriodendron tulipifera*); *liriodendronella*, however, mines both surfaces of the leaves, not, as Dr. Clemens states, the under surface only. I have not succeeded in breeding the species, which I believe to be *P. liriodendronella*, from leaves of magnolias. At p. 207, vol. iii., in the *Canadian Entomologist*, I have stated that the species of magnolia so mined were *M. glauca* and *M. grandiflora*. It may mine those species, but the leaves in which I have taken it were those of the cucumber tree, *M. acuminata*, and the umbrella tree, *M. umbrellata*. The mines in poplar, magnolia, liriodendron and smilax leaves are similar to each other, white, with a line of frass, and the second and third, and possibly the first and fourth, are found on both sides of the leaves, long and winding; at some part winding in concentric circles. The mines of *vitigenella* and *liquidambarisella* resemble each other: they are like small snail tracks, indistinct, long and irregular, and confined to the upper surface, and show no line of frass. The mine of *Ampelopsiella* is always on the lower surface, and by confluence of its narrow lines becomes a white blotch.

The mines of *vitifoliella*, and the mine of the unknown species mentioned in the *Canadian Entomologist*, vol. iii., p. 208, are long, winding, irregular, distinct, with a central line of frass, and confined to the upper surface.

TISCHERIA.—*T. tinctoriella* (n. sp.)

Palpi and face saffron yellow: vertex, thorax and anterior wings rather deep saffron yellow, dusted with dark brown; the dusting is rather dense along the margins of the wings and in the apex, and there is a patch of brown scales on the dorsal margin, at the beginning of the cilia. *Al. ex.*, over one fourth of an inch, Kentucky.

The larva mines the leaves of the black oak (*Quercus tinctoria*) and the chestnut (*Castanea americana*). The mine is very singular, and is one of the prettiest mines that I have seen. Before I had seen the larva, I supposed it to be the mine of a *Lithocolletis*. At first a small portion of the upper cuticle of the leaf, nearly circular in outline, is loosened; then the larvæ proceeds to construct a circular *nidus* or

depression, lined with silk, and precisely like that of many species of *Lithocolletis* of the flat group; at one side of this *nidus* is the little circular aperture from which the frass is ejected, and from which the imago ultimately makes its egress; then the mine is spread out from the *nidus*, in every direction, except on the side of the aperture. It is white, streaked with short, zigzag, purple lines, which are especially abundant on the *nidus*. When alarmed, the larva retreats into its *nidus*, and in it it also passes the pupa state. It is altogether unlike any other mine that I have seen.

T. badiella (n. sp.)

Very pale lemon (almost creamy) yellow, becoming slightly reddish along the apical half of the costal margin and around the apex. Palpi and antennæ of the general hue. A small spot of scattered brown scales at the beginning of the dorsal cilia; a row of scattered brown scales around the apex, at the base of the ciliæ, and a similar row along the basal half of the dorsal margin. *Al. ex.*, one fourth inch, Kentucky.

The larva mines the upper surface of leaves of the white oak (*Quercus alba*). The mine, while fresh, is white; when dry, it becomes slightly yellowish. It resembles the mine of *T. malifoliella*, being oblong and of irregular outline, and when mature the upper cuticle becomes corrugated. It is usually placed near the edge of the leaf, sometimes at the edge, in which case, when it is mature, the edge of the leaf is folded upward, over it. Possibly this may be *T. zelleriella*, Clem., but it is almost impossible to recognize any of these closely resembling species in Dr. Clemens' brief description. I have another species (?), at least an insect more deeply colored, bred from mines in leaves of *Q. obtusiloba*, which I suppose to be *zelleriella*. Both mines resemble that described by Clemens as that of *zelleriella*, and they may both prove to be lighter or darker shades of that species.

T. quercivorella (n. sp.)

Face, palpi and antennæ very pale yellowish; vertex darker yellow; thorax and primaries pale lemon yellow, the primaries becoming tinged with red at the apex, where they are sparsely dusted with pale brownish red; ciliæ of the general hue. Hind wings and ciliæ pale yellow or fulvous. The most striking colorational peculiarity about it is the large fuscous patch on the under side of the wings (both pairs) at the base. *Al. ex.*, nearly one third inch, Kentucky.

The larva mines the upper surface of the leaves of *Quercus nigra* and *Quercus obtusiloba*. The mine is at the edge of the leaf, which is curled upward, over it.

Possibly this may be *T. citripenella*, Clem., but I can not at all reconcile his description of that species with the markings of this. His account of the mine agrees better with this, but he does not say what species of oak he found it on, nor does he mention the conspicuous brown spot on the under surface of the fore wings, though he mentions something like it on the hinder pair.

T. fuscomarginella (n. sp.)

Golden yellow; the fore wings more reddish, and becoming deeper toward the apex, where the margins, especially the costal margin, is deeply suffused with purplish fuscous, which in some lights is distinctly purple. Ciliæ reddish yellow, tinged with fuscous along the costa. *Al. ex.*, one fourth inch, Kentucky. The fuscous margins of the fore wing and the character of its mine distinguish it from other known species.

The larva mines the leaves of white oaks (*Quercus alba*) on the under surface, at the edge, the leaf being curled downward, around the mine.

T. zelleriella (?)—Clem.

Dr. Clemens does not say what species of oak is the food plant of this species, and his description is not definite enough for a species of a group, the species of which resemble each other as closely as do our oak-feeding *Tischeriæ*; I am therefore not certain that my specimens belong to this species. My supposed *zelleriella* were bred from mines on the upper surface of *Quercus obtusiloba*.

T. purinosella (n. sp.)

White, almost hoary, with a faint tinge of creamy yellow; antennæ yellowish; vertex dusted with fuscous; thorax and discal portion of the fore wing sparsely dusted with fuscous; basal half of the costal margin and apex of fore wings densely dusted with fuscous; ciliæ pale fulvous; anterior surfaces of first two pairs of legs dusted. *Al. ex.*, one fourth inch, Kentucky.

The larva mines the leaves of the white oak (*Quercus alba*).

T. Castaneæella (n. sp.)

Face and palpi whitish yellow; vertex yellowish white. Thorax and primaries pale saffron, almost golden yellow, without markings, but becoming darker and more reddish toward the apex of the wings, where they are dusted sparsely with brownish red or rather with dark brick red. Ciliæ of the general hue; abdomen beneath densely dusted with brownish yellow.

This is the largest *Tischeria* that I have met with, measuring nearly one third inch in *al. ex.* The larva mines the leaves of the chestnut (*Castanea americana*).

The oak-feeding *Tischeria* of this country form a very difficult group. The three species described by Dr. Clemens are stated to have been bred from oak leaves, but Dr. Clemens does not say what kind of oak leaves. *T. badiella*, Cham., and *T. quercivorella*, Cham., were bred from *Quercus alba*, *Q. nigra*, and *Q. obtusiloba*. They are the only species known to me which might be mistaken for either of Dr. Clemens' three oak-feeding species; for, while considering Dr. Clemens' description of the imago alone, *T. tinctoriella*, Cham., might possibly be mistaken for one of them, the character of the mine separates it distinctly from them all, and *T. fuscomarginella*, Cham., is widely enough separated by the brownish margins of the primaries, and by the character of the mine, the edge of the leaf being curled downward, although it is found in the leaves of *Q. alba*. *T. tinctoriella* mines leaves of *Q. tinctoria*. In a publication by Prof. Frey, of Zurich, and M. J. Boll, of Baumgarten, two species are mentioned which were bred from leaves of *Q. tinctoria*, gathered by Mr. Boll in this country, and which Messrs. Boll and Frey suppose to be *T. zelleriella*, Clem., and *T. quercitella*, Clem. But *T. tinctoriella* is the only species that I have ever bred from *Q. tinctoria*, and the mine separates it very distinctly from the other species; it does not curl the leaf at all, and is at first sight much more likely to be mistaken for the mine of a *Lithocolletis* larva of the flat group than for that of a *Tischeria*. *T. castaneæella* might possibly be mistaken for *zelleriella*, but for its large size.

T. malifoliella, Clem.

In vol. iii., p. 208, of the *Canadian Entomologist*, I have recorded the breeding of this species from the leaves of various plants, and suggested that it probably mined other *Rosacæ*; since then I have also bred it from the dewberry (*Rubus canadensis*).

In the pamphlet above mentioned, Prof. Frey and Mr. Boll mentions having bred a species from leaves of the blackberry (*Rubus villosus*), which they consider distinct from *malifoliella*, and described under the name of *T. anea*. They also state that they have bred an allied species, which they describe as *T. rosetticolla*. The species from the blackberry I have known for several years; I have not considered it distinct from *malifoliella*, Clem., and I regard the specimens bred from all the species of *Rubus*, *Pyrus*, *Malus* and *Crataegus*, as belonging to the same species, *T. malifoliella*, Clem. *T. rosetticolla* I have not seen; I incline to doubt its specific difference from *malifoliella*.

In the two following allied species I observe a peculiarity which I have not heretofore observed in any other species, nor have I seen any reference to it by any author. It is this: the third joint of the palpi have two long bristle-like scales, about as long as the joint itself, which spring from its base on the under side, and which I think are usually appressed to the surface, so as not to be distinguished from it, but which it can, and *in articulo mortis* always does, separate from the joint, so as to form with it a letter V.

T. ambrosiella (n. sp.)

Lemon yellow, or, perhaps, more properly, ochereous yellow. Face and palpi whitish yellow; thorax and fore wings dusted with dark brown, the dusting being almost uniform over the general surface of the wing, but in some portions aggregated into lines and spots. One of these lines begins on the costa, not far from the base, and passes very obliquely backward as far as the fold in the direction of a small patch of dusting about the middle of the dorsal margin. There is a larger patch of dense dusting immediately before the costal cilia, and an opposite dorsal one, and the apex is densely dusted. The cilia are of the general hue, or a little paler, with a dark brown "hinder marginal" line at their base. The antennæ are brown, and the first two pair of legs are dark brown on their anterior surfaces; the posterior pair and the venter are yellow. *Al. ex.*, a little more than one fourth inch, Kentucky; in Summer and Fall.

The larva mines the leaves of *Ambrosia trifida*. The mine is irregular in outline, longer than wide, and sordid whitish; the parenchyma being eaten out entirely, except within the limits of the circular *nidus*, in which the pupa reposes, and into which the larva frequently retreats. The *nidus* bears some resemblance to those of the beetle *Metonius laevigatus* and those of some species of *Lithocolletis* of the flat group, as *e. g.*, *L. guttifinitella*, Clem., but it differs from mines of that character by

being most distinct on the *under*, instead of the upper side. It is indicated on the upper side only by a slight mamillary bulge, the parenchyma not being removed, while on the under side the cuticle is loosened and the parenchyma eaten over the whole mine. The imago emerges through the under surface. In all these respects it is in marked contrast with the species described below, and which is nearly allied to it in many respects.

I have also received from Miss Mary E. Murtfeldt, of St. Louis—to whom I am under many obligations for “Micros”—specimens which I believe to belong to this species, and which only differ from it by being a little paler and less dusted. Miss Murtfeldt bred them from mines in the leaves of *Ambrosia artemisiifolia*, one of which she sent to me. This mine is at the edge of the leaf, while in *A. trifida* the mine occurs anywhere on the leaf; and the species from *artemisiifolia* emerges *through the edge* of the leaf, instead of from the under surface, nevertheless, I think it is the same species.

T. heliopsisella (n. sp.)

This species, while closely allied to the preceding, differs from it strikingly in some respects. It also mines the leaves of *A. trifida*, and also those of *Heliopsis laevis*. The mine is of irregular outline, approaching the circular or ovate form, and larger than that of *ambrosiella*. It is placed anywhere in the leaf; the parenchyma is entirely eaten out, except from the *under* surface of the *nidus*, which is most distinct on the *upper* surface. The imago emerges from the *upper* surface. The mine is sordid whitish, and the *nidus* is indicated on the *under* surface by a mamillary bulge. The insect, though similarly colored, is decidedly distinct from *ambrosiella*, besides being larger, measuring three eighths inch in *al. ex.* In Kentucky it is found at the same seasons with *ambrosiella*, which it resembles, but is more distinctly marked, and more densely dusted.

The two anterior pairs of legs are dark brown on their anterior surfaces; the third pair is yellow, *with the tibia marked with brown on the outer surface, and the tarsi dark brown annulate at the joints, with yellow*; the venter is deeper yellow, *and tinged with fuscous at the margins of the segments*; the palpi and head are ochereous yellow, and the tuft on the vertex is a little flecked with brown. The thorax and anterior wings are deep ocher yellow, with golden reflections in some lights; the thorax is dusted with dark brown scales, *with a dark brown line from the anterior margin to the tip, and another over the tegulae, passing back along the base of the dorsal margin of the fore wings*; the fore wings are

less dusted, but are traversed by numerous dark brown oblique streaks, which are confluent, and which occupy nearly half the superficies of the wing, which is of a deeper ochereous yellow than in *ambrosiella*; as in that species, the entire costal margin is dusted with dark brown, the dusting, however, in this species is very dense, and is continuous with the dusting of the apex; as in *ambrosiella*, also, there is a dark brown streak (which in *ambrosiella* is only a streak of dusting), which begins on the costa, not far from the base, and passes very obliquely back as far as the fold, in the direction of a dark brown spot, placed about the middle of the dorsal margin. But in *heliopsisella* this streak is intersected about its middle by a straight, median, dark brown streak from the base of the wing, and the oblique streak itself sends off backward, within the costal margin, a short dark brown streak which runs parallel to the costa, and which is connected across the wing, just behind the middle (by a streak of dusting), with a dark brown streak, which is emitted obliquely backward from the dark brown dorsal spot. About the apical third of the wing length a narrow dark brown streak passes obliquely across the wing to the dorsal margin, at the beginning of the cilia, and proceeds thence around the base of the dorsal cilia. This oblique line, moreover, from about its middle, sends obliquely backward two lines to the apical cilia, which are a little lighter than the ground color of the wing. The dark brown lines which thus traverse the surface of the wing and intersect each other are somewhat difficult to trace out, because they occupy so much of the surface of the wing, and the spaces of the ground color are also a little dusted with brown. The ground color is deeper than in *Ambrosiella*, and the dark brown scales are condensed into more distinct lines. It has all the marks of that species more developed, and others, which are indicated by the italics above.

ÆCOPHORA—*Æ. Shaleriella* (n. sp.)

This insect was captured frequently at Camp Bee Spring, of the Kentucky Geological Survey. I place it in this genus, which it seems to me to approach nearly, though it is not a typical specimen of the genus. The species of this group (which I incline to think ought not to be included in the family *Gelechiidae*, though they approach it closely), are sometimes difficult to locate among the various genera composing it. Thus, *Callima argenticinetella*, Clem., appears to me to be very nearly, if not quite, a typical *Æcophora*; *Æ. boreasella*, Clem., differs slightly from it, but not enough to remove it from the genus; *Æ. australisella*, Cham., and this species have strong affinities with *Dasycera* and *Æcogonia* and

Endrosis, and *Hamadryas bassettella*, Clem., approaches *Butalis* somewhat, though it is perhaps nearer to *Dasycera*, and will probably be found to belong to *Panecalia*.

In this species the antennæ are more like those of *Ecogonia*, though smaller even than in that genus; the palpi more slender than in *Callima argenticinctella*, or *Ecophora boreasella*, resemble those of *Ecogonia* perhaps more than those of *Dasycera*; the ornamentation is rather that of an *Ecophora*; the form of the head allies it to *Dasycera*, being a little full in the face, and not rising high above the eyes. The form and neururation of the wings is that of *Ecophora australisella*, having, however, in the fore wings, the apical branch of the subcostal vein simple instead of furcate, as in the latter species, and in the true *Ecophora*, and it agrees with *Ec. australisella*, and differs from the true *Ecophora* in its slender palpi and antennæ. *Ec. australisella* has the basal joint of the antennæ clothed with long scales on its front margin, depending over the eyes, as in *Endrosis*, and this species *Ec. shaleriella*, unlike all the others, has the stalk of the antennæ ciliated. The neururation of this species is exactly that of *Ec. boreasella*, which see.

Second joint of the palpi white, with a pale yellowish tinge toward the apex; third joint black; antennæ dark brown, with silvery cilia; face white; vertex dark brown; thorax and base of the primaries brown, with a faint metallic luster, and this hue extends all along the costal and dorsal margins of the fore wings, to a fascia, which is placed at about the basal fifth of the wing, and is margined both before and behind with the metallic brown hue, being entirely surrounded by it; in the brown basal portion of the wing, before the fascia, is a lemon yellow spot; the fascia is silvery white, with a pink tinge above the fold, and simply white beneath it; behind the fascia the wing is lemon yellow on the disc, but the brown hue still extends along both the costal and dorsal margins, and about the middle of the costal margin the brown color spreads, so as to cover the costal half of the wing beyond the middle; it also deepens in color, and extends as far as the cilia, and contains near the middle of the wing (just behind the point where it widens) a patch of scattered silvery scales. It is followed on the costal margin by a lemon yellow spot, which is margined before (next to the brown) by a silvery fascia. Beyond this lemon yellow spot the apical part of the wing is brown, and so are the dorsal cilia, except a small lemon yellow spot at their beginning, and also immediately at the apex, where they are lemon yellow. Beyond the first fascia the brown of the dorsal margin does not extend to the cilia, but passes gradually into a large velvety black patch on the margin, which contains three bright metallic spots, and two small lemon yellow ones,

and which is separated from the brown of the costal half wing by the lemon yellow of the disc, which extends backward to the middle of the dorsal cilia. Secondaries fuscous. *Al. ex.*, one half inch.

COLEOPHORA—*C. Shaleriella* (n. sp.)

White; extreme costa near the base brown. The fore wings are marked with several longitudinal ochereous lines, which appear in some lights to be faintly tinged with golden. One of these lines begins on the base just within the costa, and reaches the costal margin just before the cilia; another begins at the base beneath the fold, and reaches the dorsal margin at the fold; another extends along the dorsal margin; there is an indistinct line above the fold, but close to it, which begins about the basal one fifth and extends parallel to the fold to the dorsal margin; two others begin at nearly the same point with that last mentioned, one of which goes to the costal cilia, and the other along the middle of the wing, sending off one (or two?) branches to the costal cilia. The cilia are yellowish white. The antennæ are simple, and are not annulate with brown. *Al. ex.*, 7-16ths inch.

This species evidently approaches *C. cratipenella*, Clem., which I have not seen; but the markings on the wings differ from Dr. Clemens' description, and *cratipenella* has the antennæ annulate with brown. It is sufficiently distinguished from *C. gigantella*, Cham., by the size as well as by the ornamentation. It was taken at the light at Camp Bee Spring, of the Kentucky Geological Survey (Edmonson county), and I have named it in honor of Prof. Shaler, State Geologist of Kentucky.

ORNIX—*O. quercifoliella* (n. sp.)

Iron gray, mottled with dark brown; labial palpi gray, with two brown annulations between the middle and tip of the third joint. Legs and under surface pale yellowish gray, streaked and spotted with dark brown; antennæ dark or brownish gray, faintly annulate with pale gray; thorax brown, with the tip pale gray; fore wings iron gray, obscurely streaked and spotted with dark brown and white, having a brown spot about the middle of the costal margin, behind which is a curved brown streak, which passes obliquely backward, nearly half way to the dorsal margin, and thence curves backward toward the tip, becoming almost confluent with another straight, oblique costal streak, behind which again is another very narrow, straight, oblique, costal, dark brown streak; behind the brown spot above mentioned are two or three very indis-

inct pale gray streaks; the curved streak is margined behind indistinctly by pale gray, and on the costa, between the curved streak and the first straight, oblique streak, is a minute white streak, margined all around by a narrow, dark brown line; the first straight, oblique streak is margined behind faintly by pale gray, and the third (narrow) oblique streak is margined behind by a narrow, faint, metallic white streak, which passes obliquely backward to the middle of the apical part of the wing. At the apex is a circular brown spot, which has a small white costal streak or spot before it, and also an opposite dorsal one, and is margined behind by an almost semi-circular, narrow, white line, along the base of the cilia, which are dark brown at the apex; the dorsal cilia are pale gray. The apical spot is thus, by means of the semi-circular line and the opposite costal and dorsal streaks, entirely surrounded by white, except in front, and partly on the costal margin. The dorsal margin of the wing is largely margined with white, especially near the base; just within the basal fourth is a very small, dorsal, white streak; another, a little larger, is placed just before the middle; just behind the middle are some indistinct, zigzag, brown lines, partly margined with white; about the apical fourth is a very oblique, slightly curved, dorsal, white streak, dark margined behind, and extending around and beyond a small dark brown dot, just before the cilia. *Al. ex.*, one third inch.

A single specimen received from Miss Murtfeldt, who informs me that the larva curls down the edge of oak leaves. In its earlier stages it is, probably, a leaf miner.

NEPTICULA.—*N. castaneaefoliella* (n. sp.)

This species makes a linear, crooked mine on the upper surface of leaves of the chestnut (*Castanea americana*). The larva is bright green, and the mine has a distinct central line of frass.

The imago has the palpi, vertex and eye-caps creamy white; head dark brown; thorax and primaries dark purple brown, with pale ciliæ. Posterior tibiæ and anterior legs, except the femora, dark brown; legs otherwise sordid whitish, silvery tinged; abdomen greenish above, beneath whitish, margined with fuscous along the sides; antennæ brown above, pale fuscous beneath, and very faintly annulate with white. *Al. ex.*, $\frac{5}{32}$ inch, Kentucky.

N. fuscotibiella, Clem. *N. ciliæfuscella*, Cham.—*Can. Ent.*, vol. iv., p. 128.

Dr. Clemens describes the species as having the ciliæ pale grayish. In the captured specimen, from which *ciliæ fuscella* was described, the

ciliæ appeared black, probably from having been a little singed by the lamp; since then I have bred the species from willow leaves, and I am satisfied that it is the same described by Dr. Clemens. The mine is long, narrow, and on the upper surface it gradually widens throughout its entire length, but does not become wide at any time, and at about the middle of its length it is bent sharply backward, the large end being bent back to the narrow one, like a long, slender club, bent double. *N. apicalbella*, Cham., only differs by having the *apical* ciliæ white.

N. nigriverticella (n. sp.)

Face rust red; palpi silver-tinged, yellowish white; tuft, small and black; eye-caps pale ocherous; antennæ fuscous, silver-tinged. Thorax and primaries pale ocherous, faintly dusted with fuscous; at the base of the dorsal margin of the fore wings is a purple black spot, extending half across the wing, and just at the beginning of the cilia is a wide purple black fuscia; cilia very pale ocherous. *Al. ex.*, one fifth inch, Kentucky. The food plant is unknown. It was taken May 12th, on the hunk of a wild cherry tree, sitting very close. But I know only one *Nepticula* mine of the wild cherry leaves, and the species which produces it is very different from this, and has been already described by me as *N. serotinceella*.—*Can. Ent.*, vol. v., p. 126.

N. resplendensella (n. sp.)

In rich, gorgeous and brilliant adornment this species surpasses all other *Nepticulæ* known to me; indeed, I had almost written that it surpasses any other microlepidopteron known to me, and, indeed, while some others surpass it in variety of coloration, I know of none more gorgeous and brilliant. The scales are very fine and smooth, and shining, unlike the rough, large scales of many species. The palpi are whitish; the tuft pale reddish saffron, and the tips of the tarsi are pale yellowish; in other respects it is exceedingly difficult to determine what its real hues are. To the naked eye it appears of a brilliant deep black, with a wavy golden band extending along the middle of the fore wings, from the base to the tip. Under the lens the basal half of the costal margin of the fore wings, and a large spot extending along the base of the costal fringe, nearly to the tip, and more than half across the wing, are deep purple or deep velvety black, with a rich purple tinge; all other parts of the wings, the fringes, the body, and legs, are of a brilliant metallic luster, like burnished steel or silver, with prismatic reflections, and, in a bright light, glistening like gold in the sunlight.

I think that if one could ever get rid of its prismatic resplendence, its true color would be best described as bright silver, tinged with gold, except the basal half of the costal margin, and the large spot at the base of the cilia, before mentioned, the true color of which are a rich purple black. *Al. ex.*, one fourth inch. Two specimens captured May 23d, under hackberry trees (*Celtis occidentalis*).

N. unifasciella (n. sp.)

Palpi, legs, under surface of the thorax and abdomen, upper surface of thorax and basal two thirds of the upper surface of the wings shining black, with a brilliant metallic luster, like polished steel or silver, so that a silvery white, rather wide, fascia, placed at the apical third of the wings, is scarcely distinguishable in some lights from the remainder of the wing; this fascia is nearly straight, and the wing behind it and the fringes are deep purple black, and the costal margin, from the base to the fascia, also shows the purple gloss. Under surface of the wings deep black; antennæ black; head and face rufous; eye-caps silvery white. The scales are fine and smooth, and it is no mean competitor of the preceding species as to beauty. *Al. ex.*, three sixteenths inch, Kentucky.

BUCCULATRIX—*B. ambrosiaefoliella* (n. sp.)

Face white; eye-caps white; antennæ with alternate annulations of white and dark brown; vertex white, stained with ochereous brown; thorax ochereous yellow, faintly sprinkled with brown. The ground color of the fore wings seems to be white, but it is so much overlaid with pale ochereous that the white is only distinct in a few places; thus, the basal portion along the costa, for nearly one third of the wing length, is whitish, faintly sprinkled with pale ochereous and brown; and there is a distinct, curved, white streak, forming an arc of a circle, beginning on the dorsal margin, just before the middle, and curving back to the dorsal margin, just behind the middle, and margined toward the dorsal margin of the wing (that is, within the arc) by black scales; the scales between this black internal edging of the arc and the costal margin are ochereous; the extreme costa, near the base, is dusted with dark brown, which ends just before the middle in a short, oblique, brown streak; there are also scattered blackish scales along the dorsal margin, near the base. About the middle of the costal margin begins a long, dark brown streak, which passes obliquely across the wing, to the hinder

angle, and thence along the base of the cilia to the tip ; it is margined on the costa rather indistinctly by white. The dorsal cilia are whitish, mixed with ocherous ; there is an oblique streak of dark brown in the cilia behind the tip, and a few scattered scales of the same hue, above the base of the costal cilia. Under surface and legs very pale ocherous. *Al. ex.*, 5-16ths inch. The larva feeds on the leaves of *Ambrosia trifida*.

B. quinquenotella (n. sp.)

Face, and entire under surface of body and legs, silvery white, with a faint, yellowish tinge, and the tarsi dusted with brown on their anterior surfaces ; antennae with alternate annulations of silvery white and black ; tuft silvery white, becoming brick red on top ; eye-caps silvery white ; fore wings reddish orange or reddish ocherous, according to the light, and sparsely flecked with brown. The basal part of the fore wings is much lighter than the remainder, and the apical part is more distinctly yellowish than the middle, which is darker. There are three silvery white costal streaks : the first is placed at about the basal fourth, and extends obliquely across the wing to the dorsal margin, just before the dorsal tuft, but becomes near the dorsal margin somewhat suffused with or even interrupted by yellowish scales ; the second is small, straight, near the middle of the wing, and the third is placed just behind the beginning of the cilia, is long and narrow, almost crossing the wing to the dorsal cilia, where there is a dorsal, silvery white spot immediately before it, at the beginning of the dorsal cilia. There is a patch of blackish scales in the apex margined before by a silvery streak, which does not reach either margin. The fringes are silver gray, with a very distinct, dark brown hinder marginal line at their base. The dorsal tuft is dark brown, and in perfectly fresh specimens there are a few scales longer and darker than the others projecting from it. *Al. ex.*, one fourth inch, Kentucky.

It seems to resemble Dr. Clemens, *B. trifasciella*, but can not be it if Dr. Clemens has correctly described that species.

B. packardella, Cham.—*Can. Ent.*, vol. iv., p. 151.

I have bred this species from cocoons found on the trunks of beech trees. The description *loc. cit.* was made from two specimens taken at the light, and on comparing them with bred specimens, I find that they were a little singed. In the bred specimens the "small brown dot on each side of the apex of the thorax" is absent, and the portions

described as orange chrome vary with the light, becoming golden brown or greenish brown, according to the light; there is also an indistinct tuft of brown scales on the dorsal margin, about the middle. I have not seen *B. trifasciella*, Clem. It must resemble this species closely, but I do not find the third silvery streak mentioned by Dr. Clemens.

Class *Cephalopoda* (Cuvier), as represented in the Cincinnati Group.

By S. A. MILLER.

This class is divided into two orders: 1st, *Dibranchiata* (two gilled); 2d, *Tetrabranchiata* (four gilled). The *Dibranchiata* are the highest organisms in the molluscan scale, and are extensively represented, by numerous families, in the seas, at the present time, but are not known to have existed during the Silurian age. The *Tetrabranchiata* are represented by only one living family, the *Nautilidae*, though they abounded in the ancient seas of every age, from the Silurian to the Tertiary, and twenty-five or thirty families are known only by their fossil remains. In these families more than 2,000 species have been described.

The *Nautilus pompilius*, it is said, inhabits a depth of from 20 to 30 fathoms, where it creeps, like a snail, on the bed of the sea. The chambers of the shell, not occupied by the animal, are said to contain water. The animal is attached to the shell, by means of two lateral adductor muscles, and by a continuous horny girdle around the mouth of the body chamber. The septa are pierced by a siphuncle, containing, for a short distance, a tubular prolongation of the mantle, which, in the young state, probably forms the main muscular attachment.

Prof. Owen says: "The line of attachment of both the muscles and the cincture progressively advances with the growth of the animals. A certain portion of the fundus of the shell thus becomes vacated, and the *Nautilus* commences the formation of a new plate, for the support of the part of the body which has been withdrawn, from the vacated shell. The formation of the plate proceeds from the circumference to the center, and there meeting the conical process of the mantle, which retains its primitive attachment, the calcification is continued backward for a short distance, around the process, which now forms the commencement of the membranous siphon, and acquires the partial protection of the calcareous tube. An air-tight chamber is thus